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VARIATION IN THE PYGMY MOUSE (*BAIOMYS TAYLORI*) FROM TEXAS AND ARIZONA

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INTRODUCTION

Laboratory studies of variability in natural populations of mammals have been necessarily limited to the genus *Peromyscus* because most other kinds of small mammals tested have not bred satisfactorily in captivity. The discovery that the pygmy mouse (*Baiomys taylori*) is a satisfactory laboratory animal (Blair, 1941) has made possible the investigation of the variability of *Baiomys* populations by raising laboratory stocks of known age. The present report deals with variation in a stock of *Baiomys taylori subater* (Bailey) from Texas and in a stock of *Baiomys taylori ater* Blossom and Burt (1942) from Arizona.

METHODS

Field-caught stocks of pygmy mice were shipped alive to the Laboratory of Vertebrate Biology at the University of Michigan, where they became the parents of the laboratory-bred populations. The mice were raised under the standard conditions developed for *Peromyscus* (Dice, 1929). They were killed at an age of approximately four months and then were prepared as flat skins with partial skeletons. Body measurements of the freshly killed mice were made by the senior author. Standard skeletal measurements (Dice, 1932) were made by several assistants. Color measurements were made by the same assistants, using the Ives tint photometer. Because of the small size of these mice, color readings were made only on the dorsal stripe. The statistical calculations were made by D. M. Clarke, William Jalosky, and the senior author. All expenses of this project except the collecting of the stock of *Baiomys taylori ater* and the preparation of the manuscript were supported by the Laboratory of Vertebrate Biology.

STOCKS OF MICE

The origin of the two stocks studied is as follows:

Baiomys taylori subater—La Belle. This stock descended from nine field-caught mice that were trapped by W. F. Blair on January 25 and 26, 1940, about seven miles southeast of La Belle, Jefferson County, Texas. The mice were trapped in a small area of dense tall grass (*Andropogon* sp.) surrounding a pond on a low moist coastal prairie.

Baiomys taylori ater—Hereford. This stock originated from four males and two females that were trapped by P. M. Blossom on March 26 and 27, 1941, about nine miles west of Hereford, Cochise County, Arizona. The mice were trapped along a roadside where tall grass and weeds formed a rather heavy ground cover. The mice were all obtained from a narrow strip of grass and weeds about 20 by 1300 feet, adjoining a fenced, pastured field. The elevation was 4800 feet. Field-killed specimens from the same general locality were used as the basis for describing the geographic race *ater* (Blossom and Burt, 1942).

SOIL COLORS

The two stocks come from regions of contrasting trends in soil color. The *subater* mice were living on the dark brown soils of the eastern Texas coastal prairie. The surface soil in that region is relatively low in the reflectance of red, green, and blue-violet (Table I), hence is dark in shade. The soil on which the *ater* mice were living is reddish in tone and is relatively darker than the other desert soils of the region. A sample of surface soil from six miles west of Hereford, however, is almost twice as high in tint photometer readings (i.e., paler) with all color screens than is the soil from the Texas coastal prairie. Therefore, the *ater* mice were living on soils that were paler than were the soils on which the *subater* mice lived.

TABLE I

COLOR OF SURFACE SOIL ON THE TEXAS COASTAL PRAIRIE, FIVE MILES SOUTHEAST OF LA BELLE, AND ON THE ARIZONA DESERT, SIX MILES WEST OF HEREFORD

Means of Ten Tint Photometer Readings.

Station	Red	Green	Blue-Violet
La Belle, Texas	13.8	10.4	7.7
Hereford, Arizona...	25.6	18.6	14.7

TABLE II

MEASUREMENTS OF *Baiomys taylori subater* DESCENDED FROM A TEXAS POPULATION AND OF *Baimoys taylori ater* DESCENDED FROM AN ARIZONA POPULATION

Measurements and standard errors, in millimeters.

Stocks	Specimens	Mean Age in Weeks	No. of Parents	Body Length	Tail Length	Foot Length	Ear Length
B. t. subater ♀	25	27	9	66.80 ± .57	42.60 ± .73	13.272 ± .135	10.176 ± .150
B. t. subater ♂	30	27	9	64.60 ± .34	40.31 ± .58	13.333 ± .089	10.103 ± .102
B. t. ater ♀	30	25	6	70.23 ± .78	45.68 ± .50	14.333 ± .072	10.550 ± .077
B. t. ater ♂	23	26	6	67.96 ± .42	44.89 ± .53	14.222 ± .077	10.400 ± .107

	Left Femur	Left Mandible	Condylo-Premaxilla	Condylo-Zygoma	Bullar Width
B. t. subater ♀	11.163 ± .090	11.148 ± .082	16.942 ± .118	12.896 ± .080	8.270 ± .045
B. t. subater ♂	10.650 ± .062	10.800 ± .043	16.525 ± .074	12.592 ± .058	8.200 ± .035
B. t. ater ♀	11.664 ± .105	11.138 ± .062	17.186 ± .082	13.138 ± .057	8.179 ± .039
B. t. ater ♂	11.232 ± .084	10.930 ± .071	16.848 ± .069	12.876 ± .047	8.123 ± .036

INTERPOPULATION FERTILITY

Two *subater* females were mated to *ater* males. One of these females bore three litters consisting of seven hybrid individuals. The other female bore two litters containing a total of five hybrid offspring. The two strains crossed readily, and the resultant litters were of normal size. One pair of F_1 hybrids was mated and produced a litter of three and a litter of one F_2 hybrids. Therefore, the two populations from about a thousand miles apart are interfertile to the extent of being able to produce fertile hybrids in interpopulation crosses.

VARIATION DUE TO SEX

Female specimens of *Baiomys,* like female specimens of *Peromyscus,* average generally larger than do males from the same populations. The *subater* females average significantly larger than do the males in body length, femur length, length of mandible, condylo-premaxillary length of skull, and condylo-zygomatic distance (Table II). There is no significant difference between the sexes in tail length, foot length, length of ear from notch, or bullar width of the skull. The *ater* females average significantly larger than do the males in femur length, condylo-premaxillary length of skull, and condylo-zygomatic distance. The females probably are also larger than the males in body length (P between 0.05 and 0.01). There is no significant difference between the sexes of *ater* in tail length, foot length, ear length, length of mandible, or bullar width of the skull.

As there is no significant difference between males and females of either stock in pelage color, the sexes have been pooled for comparisons between the stocks.

GEOGRAPHIC VARIATION IN DIMENSIONS OF BODY AND SKELETON

The specimens of *ater* from Arizona average significantly larger in certain body and skeletal measurements than do those of *subater* from Texas (Table II). The *ater* males are larger than the *subater* males in body length, tail length, foot length, length of femur, and condylo-zygomatic distance. The males of the two stocks do not significantly differ in length of mandible, condylo-premaxillary length of skull, or bullar width of skull.

The female specimens of *ater* average significantly larger than the *subater* females in body length, tail length, foot length, and femur length. There is no significant difference between the females of the two stocks in length of mandible, condylo-premaxillary length of skull, condylo-zygomatic distance, or bullar width of skull.

VARIATION IN PELAGE COLOR

The *ater* mice from Arizona average very significantly higher in tint photometer readings (i.e., paler in pelage color) than do the *subater* mice from the Texas coastal prairie (Table III). The two stocks differ most in

TABLE III

PELAGE COLOR OF *Baiomys taylori subater* FROM TEXAS AND OF *Baiomys taylori ater* FROM ARIZONA

Mean tint photometer readings, with standard errors. Males and females combined.

Stocks	Red	Green	Blue-Violet
B. t. subater	4.11 ± .08	2.89 ± .07	2.26 ± .07
B. t. ater	6.37 ± .12	4.48 ± .10	3.41 ± .10
Differences of *ater* from *subater*	+ 2.26 ± .14	+ 1.59 ± .12	+ 1.15 ± .12

the readings for reflected red, for the difference is 2.26 ± 0.14 tint photometer units (Table III). They differ least in the readings for reflected blue-violet with a difference of 1.15 ± 0.12 units.

Pygmy mice (*Baiomys taylori*), as represented by these two stocks, are less variable locally in color than are many populations of the genus *Peromyscus.* The *ater* stock, which is the more variable of the two in pelage color, has a standard deviation for reflected red of only 0.85 ± 0.08 tint photometer units. By comparison seventeen of eighteen stocks of *Peromyscus maniculatus* measured by Dice (1941) from the region of the Nebraska sandhills have significantly higher standard deviations for reflected red than does the stock of *ater.* The *subater* is less variable than is *ater,* with a standard deviation for reflected red of only 0.61 ± 0.06.

DISCUSSION

The pygmy mouse (*Baiomys taylori*) shows the same trend toward correlation of pelage color with soil color as do mice of the genus *Peromyscus.* In the case of the two stocks studied the mice from the paler soil were slightly but very significantly paler than those from the darkest soil (Table III). The tendency for pygmy mice to be paler on pale soils than they are on dark soils presumably is attributable to natural selection.

It is noteworthy that the tint photometer readings of the laboratory-reared mice show *ater* to be the paler of the two subspecies, although *ater* was described by Blossom and Burt (1942) as the darkest race of the species *taylori.* It should be mentioned in this connection that the type series of *ater* was not statistically evaluated for color, and these mice were of various ages of field-caught animals that were prepared in the field as round skins. This discrepancy between the tint photometer readings of the laboratory-reared mice and the description of *ater* suggest that accurate comparisons of the pelage color of different populations of mammals can be made only by colorimetric methods, using animals of known age and pelage.

The differences between the two populations are of the same sort as have been reported between geographically distant populations of *Peromyscus.* The *ater* mice are significantly larger than the *subater* mice of corresponding sex in body length, tail length, foot length, and length of femur. The *ater* males are also larger than *subater* males in condylo-zygomatic distance.

The pygmy mice show little local or geographic variability in pelage color. The standard deviation for reflected red is only 0.61 ± 0.06 tint photometer units in the *subater* mice and 0.85 ± 0.08 units in the *ater* mice. The color differences between the two stocks, although highly significant statistically, are of low magnitude.

In tint photometer readings for reflected red the *ater* are only 2.26 ± 0.14 units higher (i.e., paler) than are the *subater*. With the green and blue-violet screens the differences are even less, although highly significant statistically (Table III). As indicated by these stocks the pygmy mouse (*Baiomys taylori*) appears to have a low range of genetic variability in pelage color.

SUMMARY

Stocks of pygmy mice, *Baiomys taylori subater* from seven miles southeast of La Belle, Jefferson County, Texas, and *Baiomys taylori ater* from nine miles east of Hereford, Cochise County, Arizona, were bred in the laboratory and raised to an age of approximately four months to determine the variability in these mice.

Cross matings between the two stocks indicated their interfertility. Both an F_1 and F_2 generation were obtained.

The females in both stocks averaged significantly larger than the males in several body and skeletal measurements. The *subater* females exceeded the males in body length, femur length, length of mandible, condylo-premaxillary length of skull, and condylo-zygomatic distance. The *ater* females exceeded the males in femur length, condylo-premaxillary length of skull, condylo-zygomatic distance, and probably also in body length. There was no significant difference between sexes in pelage color.

The *ater* mice were significantly larger than the *subater* in several measurements. The *ater* males exceeded *subater* males in body length, tail length, foot length, length of femur, and condylo-zygomatic distance. The *ater* females exceeded the *subater* females in body length, tail length, foot length, and femur length.

The *ater* mice from relatively pale soil were slightly but very significantly paler than the *subater* mice from relatively dark soil. The differences in tint photometer readings for the two stocks were 2.26 ± 0.14 units for red, 1.59 ± 0.12 for green, and 1.15 ± 0.12 for blue-violet.

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